

# EUVL: Managing Changing Environments

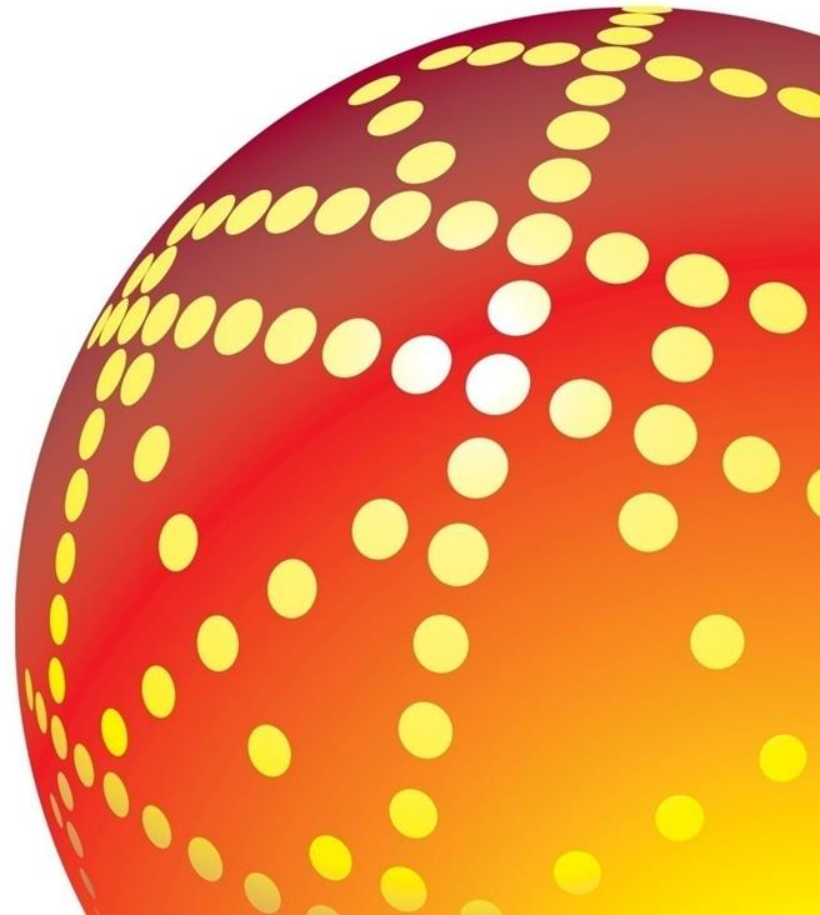
Pawitter Mangat



GLOBALFOUNDRIES

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June 12, 2013





# Panel Scope

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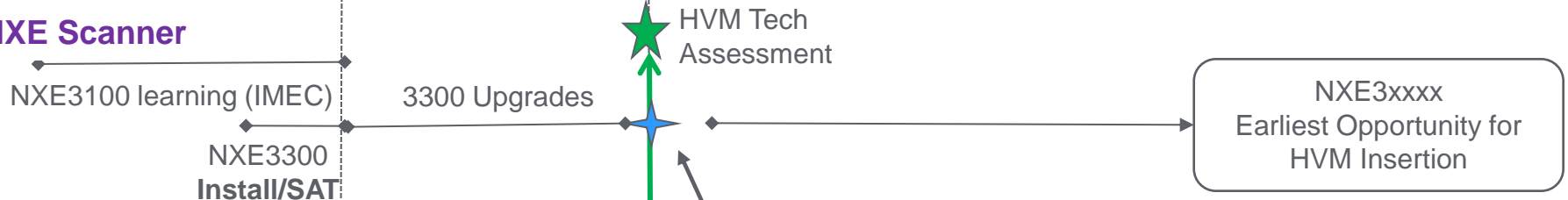
- EUV Insertion Roadmap
- EUV and 450mm
- EUV Extensibility



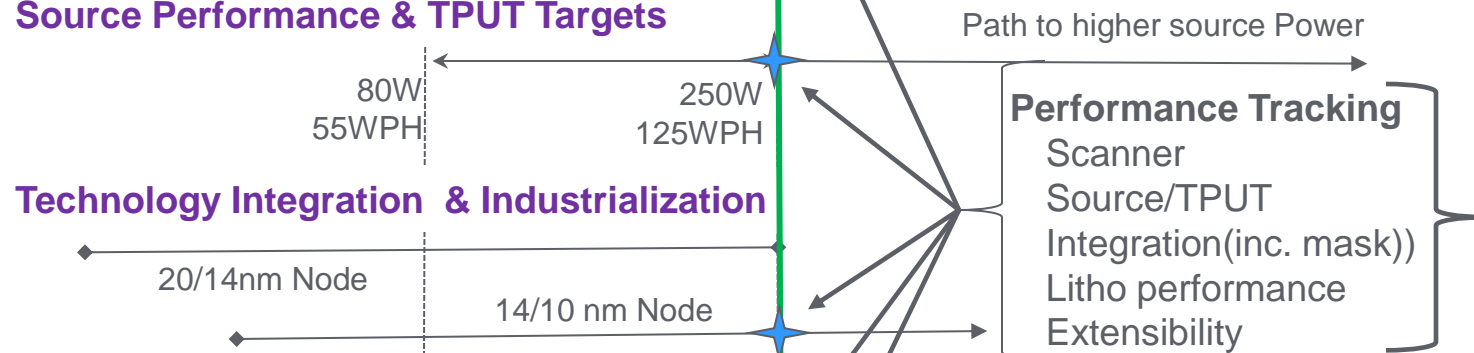
# EUV Insertion Roadmap

2013				2014				2015				2016				2017				2018			
1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q

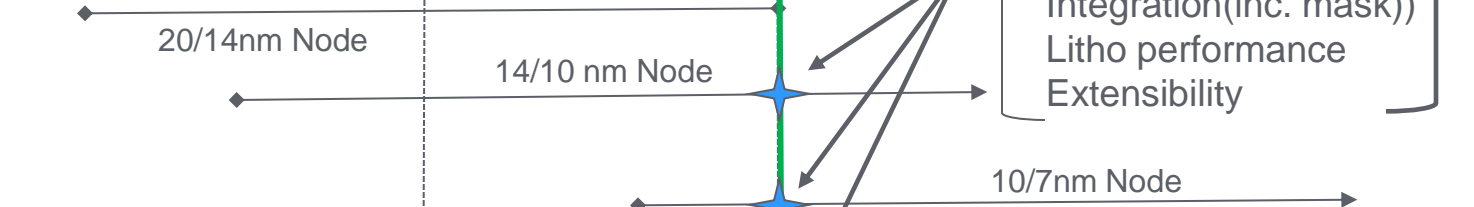
## NXE Scanner



## Source Performance & TPUT Targets



## Technology Integration & Industrialization



## EUV Extensibility(high NA/Masks...)



## Performance Tracking

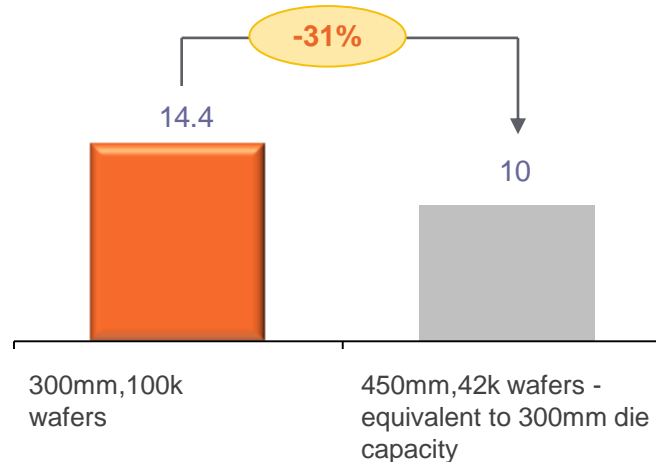
Scanner  
Source/TPUT  
Integration(inc. mask))  
Litho performance  
Extensibility



# 450mm transition

- Value creation hypothesis is to continue cost/function scaling
  - 450mm fab with a capacity of 42-45k wafer starts per month can produce the same volume of dice as a 300mm fab with 100k wafer starts per month

**Illustrative CapEx per fab 14nm node (\$bn)**



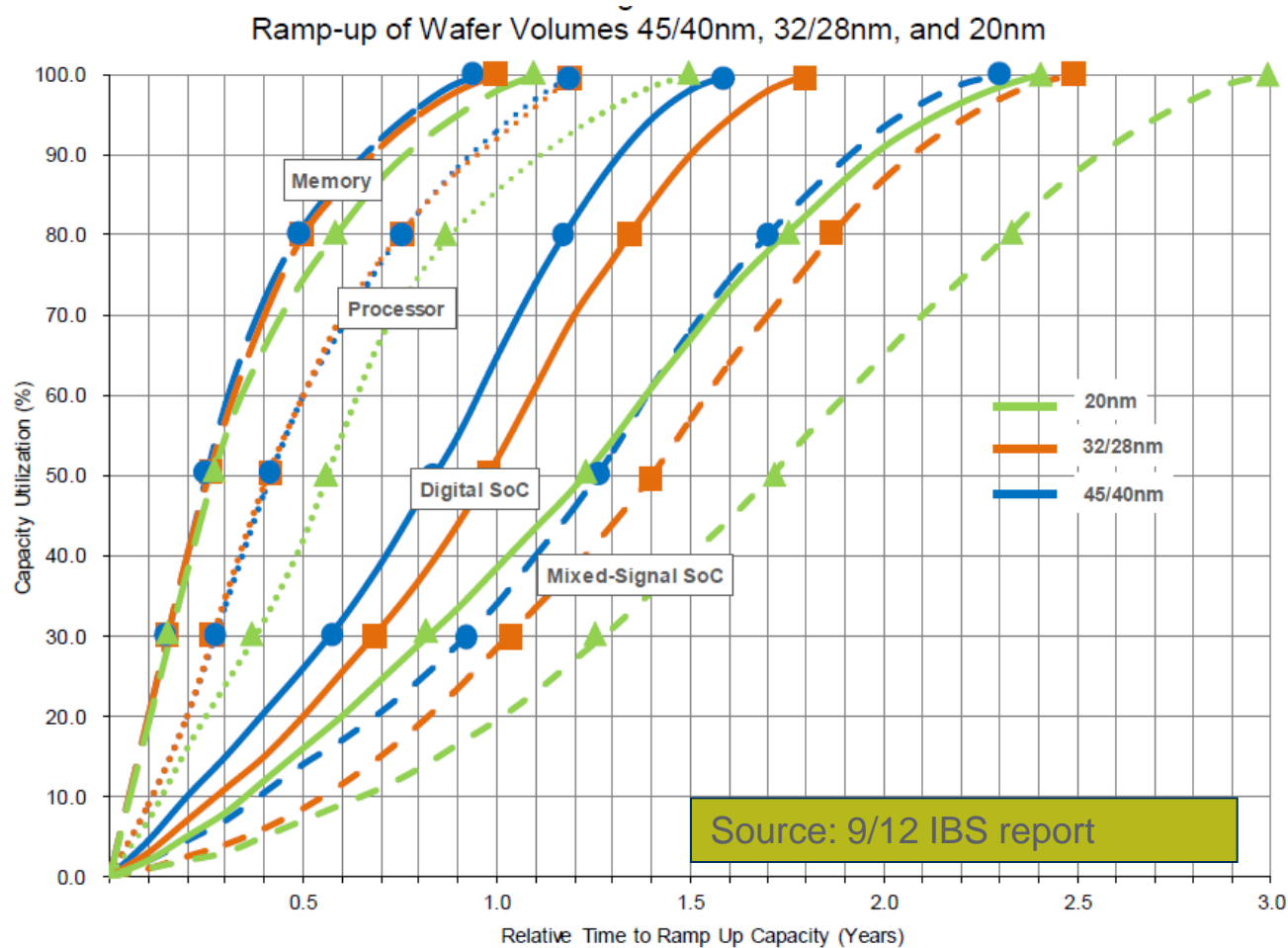
**Source: IC Knowledge Strategic cost model**

*For 10mm x 10mm die size, a 300mm wafer produces approximately **615 dice**, while a 450mm wafer produces approximately **1440 dice** per wafer*

- Approximately 30% less CAPEX and 25-30% lower cost per die compared to 300mm at the same die outs capacity and yield



# 450mm Economics not straight-forward



IBS: "...major financial challenges for foundry vendors to obtain good financial returns from their 450mm facilities unless wafer volumes can be ramped rapidly...impact of depreciation costs needs to be managed."



# Overview of G450C Program



## Public/Private Partnership



## 5 Year Program - 2017

- 5 Members companies + CNSE
- NYS matching funds
- NYS providing new Facilities/Fab
- Associate Memberships (Suppliers)
- Management Council - Governance

## Program Mngt. & Staffing

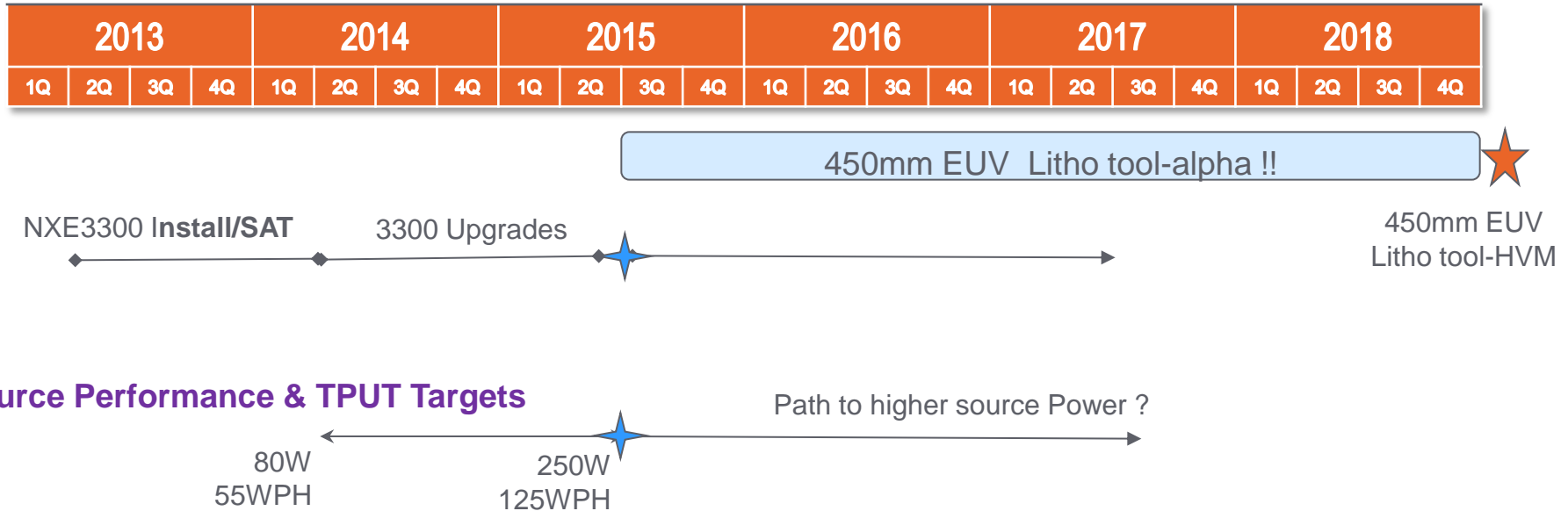
- Member Company Assignees only
- Office of the General Manager (Intel, TSMC and CNSE/NYS)
- Staffing to 60 by YE 2012
- 2013 staff (150)
- GF has key management positions

## Suppliers

- Dual supplier Strategy
- Target Approx 50 tools, 100+ capabilities
- On-site and off-site capabilities
- Litho strategy In-formulation
- Interim Litho strategy - DSA



# EUV and 450mm Roadmap



## •450mm EUV Transformation Factors

- 450mm Optical HVM established
- Successful Industry adoption of EUV for HVM at 300mm
  - Good News: NXE33xx platform designed to accommodate wafer size change, when needed.
- EUV source performance making significant progress
- EUV Extensibility will be another input



# 450mm EUV transition: Key Messages

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- GLOBALFOUNDRIES is actively monitoring 450mm development and engaged in the Global 450mm initiatives
  - We will meet the industry transition trend and introduction timing depending on semiconductor industry economics
  - Ajit Manocha CEO, GLOBALFOUNDRIES
- “Do I want to be the first one (on 450mm)? No. Do I want to be the last? No. I would like to be behind the first,” Manocha added.



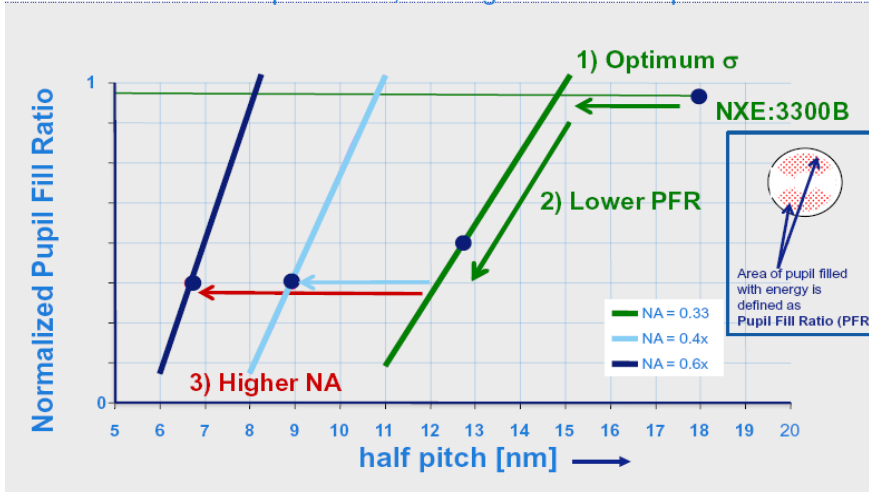


# EUV Extensibility

EUV at Cross Roads: What is the next NA? How far the current 0.33NA take us?  
This has waterfall effect on optics; masks and much more including \$\$ commitments

## EUV on NXE - 3 steps to sub 10nm CD

First illumination optimization, then higher numerical apertures

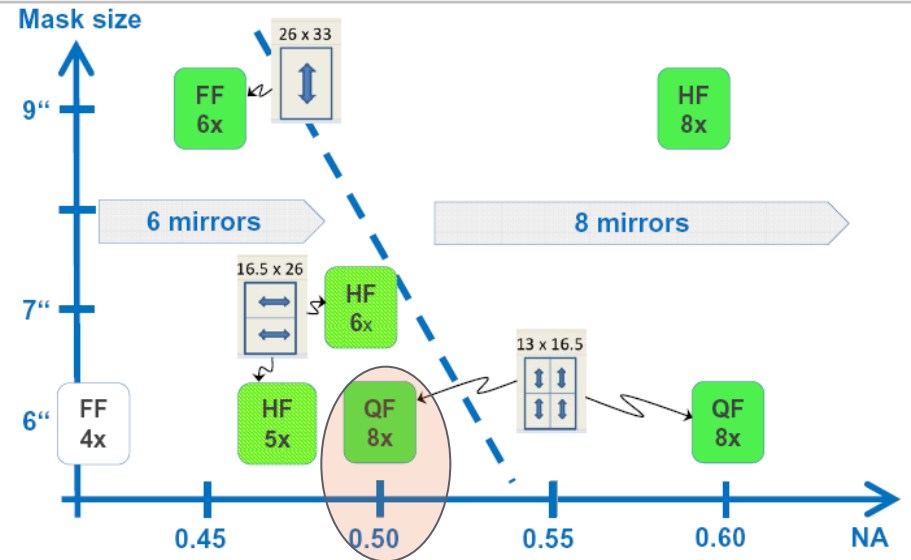


13-Jul-12 | public | slide 6

ASML

N. Harned, "ASML's EUV roadmap on the NXE platform and the 450 mm plan," IEUVI Meeting, SEMICON West, July 2012

## High-NA EUVL: There is a wide solution space.



Winfried Kaiser, Carl Zeiss SMT GmbH

SPIE, San Jose, 02/27/2013

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W. Kaiser, et al, "Mask effects for high-NA EUV," SPIE Advanced Lithography, San Jose, Feb. 27, 2013



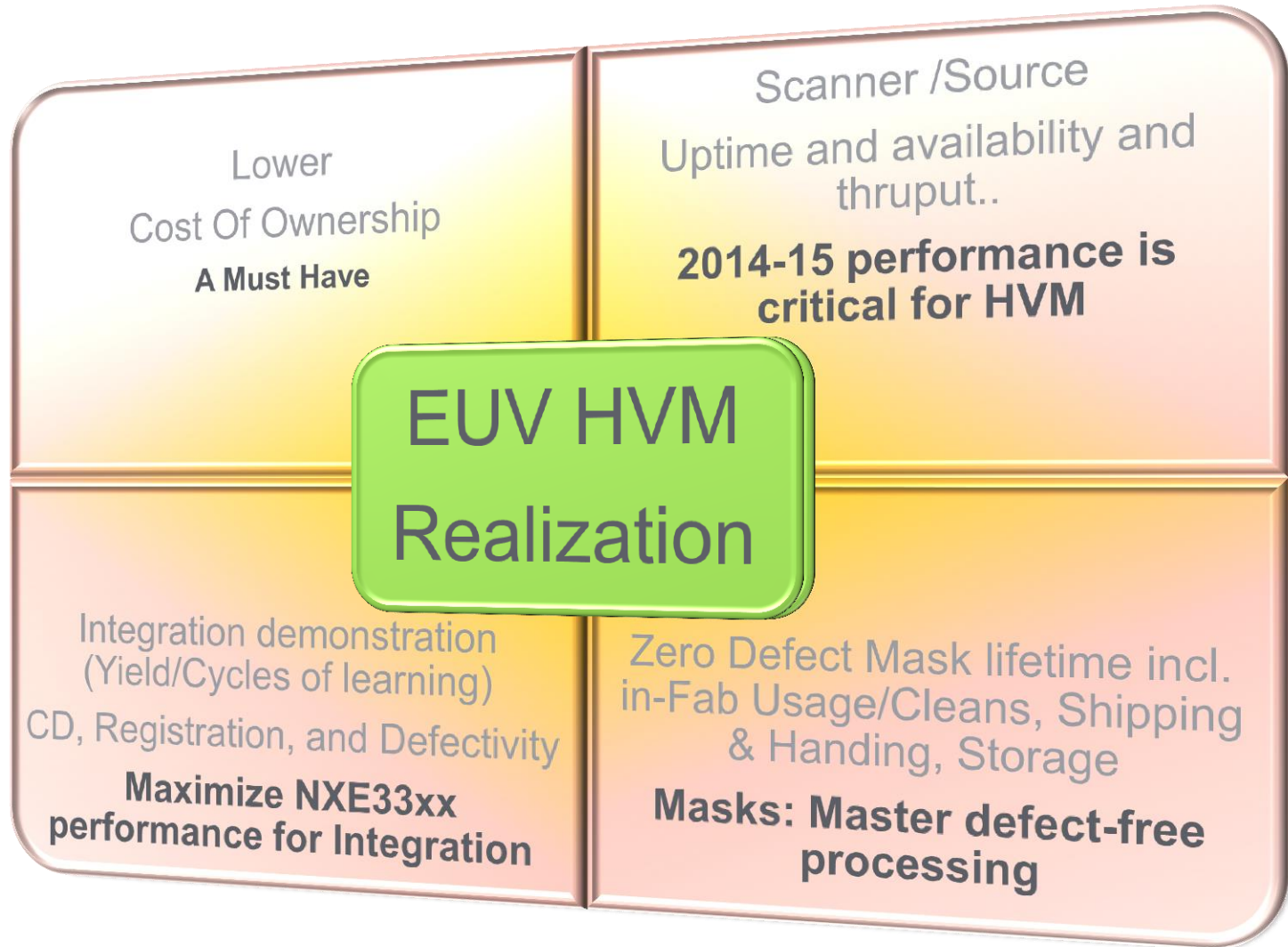
# Summary

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- Semiconductor Industry cannot afford any more delay for EUV Industrialization
- Maximizing Lithographic performance from current 0.33NA systems is critical for HVM for multi-node solutions
  - EUV mask optimization (thinner absorber) will enable EUV extensibility
- High NA decision for future needs to be agreed upon by industry soon due to long lead time for development
  - Sematech led industry forum at SEMICON WEST 2013-By INVITATION ONLY
- 450mm transition should not impact the current EUV infrastructure.



# Summary





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